

CONFERENCE ON DISARMAMENT

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Report on the second trial inspection (challenge inspection)
in the Federal Republic of Germany

Summary

At an earlier trial challenge inspection in an ammunition depot, the main emphasis had been on the significance of secondary indicators (see CD/CW/WP.278). The second trial inspection conducted in November 1989 on that basis served the principal purpose of obtaining for the first time data on the use of instruments under practical conditions. To this end, a military site with operational units was selected as a considerably more complex item for inspection.

It was demonstrated that, with the aid of random on-site checks and the use of currently available portable/transportable ultrasonics, radiography and mass spectrometry equipment, it is possible to dispel with adequate certainty the suspicion that chemical weapons are being produced or stockpiled, without sensitive information having to be disclosed.

However, depending on the number of samples and test items, the careful application of the procedures and equipment and the evaluation of the measurements may take more than 24 hours. Consequently, more efficient equipment and methods should be developed to meet the specific time requirements of a challenge inspection. In this respect, the United Kingdom's working paper of 12 January 1990 (CD/CW/WP.269) offers interesting ideas.

1. Aims

The main objective of the trial inspection, carried out on the basis of an unspecified suspicion of chemical weapons production or stockpiling, was to find concrete answers to the following questions through the practical use of instruments:

- Are the currently available ultrasonic or radiographical methods suitable for on-site, non-destructive categorization of ammunition?
- How many samples and what kind of samples can be adequately categorized on site with the aid of the mobile mass spectrometer?
- How much time is needed?
- Are three inspection assistants sufficient for the proper and efficient use of the instruments?

Furthermore, from the viewpoint of maintaining secrecy, the inspection was expected to clarify the question as to what extent the observer from the challenging country can be granted access.

2. Facilities inspected

The trial inspection concerned a military site where field artillery and NBC defence battalions are stationed. Two facilities were inspected:

- the joint barracks complex covering approx. 23 hectares and comprising an accommodation and medical area, a technical area with workshops and storage buildings, a training area, a heating station and heating oil store, a fuel store, open spaces with parked vehicles and diverse equipment;
- the associated ammunition storage site approx. 7 km away, which covers approx. 39 hectares and consists of ammunition

bunkers, equipment stores, workshops, administrative buildings and guard houses.

In keeping with its mission, the NBC defence battalion possesses special decontamination equipment, such as vehicles with tank superstructure and spraying device, stocks of chemical decontaminants and protective suits, as well as special equipment for the detection of chemical weapons.

3. Inspection team, observer, escort

The reinforced inspection team consisted of eight persons:

- two chemical weapons specialists responsible for the actual inspection activities,
- one expert on the forces inspected,
- two security experts responsible for checking the security measures of the unit inspected,
- three technical inspectors for carrying out checks with test and analysis equipment.

The team was accompanied by one officer acting as observer of the challenging country and by an in-country escort.

4. The inspection proper

The trial inspection, which was planned to last 24 hours, began with the arrival of the team at the facility to be inspected. After a short briefing, the inspectors asked questions, many of which were only answered after consultation with the in-country escort. This subsequently led to far-reaching demands by the inspectors.

Throughout the inspection, the observer made use of his right to suggest specific checks to the inspection team. He was given the same access and information as the inspectors. A restriction of his activities occurred when the inspection team

was temporarily divided into two groups in order to carry out parallel checks at different points. The observer was free to choose where to take part. For the sake of an efficient inspection, the team refused to carry out all checks one after another merely so that the observer would be able to observe all inspection activities.

During the random checking of the accommodation, administrative, medical and technical areas, the inspectors were permitted to examine the relevant files and regulations and to take samples from diverse containers for immediate analysis. Some ammunition and chemical bunkers and stores were selected for closer examination, the choice being made either arbitrarily or on the basis of hazard class markings.

For the physical determination of the contents of ammunition and containers without opening them or taking samples, use was made of an ultrasonic wall thickness tester, an electrostethoscope and radiographic equipment.

For the qualitative chemical categorization of chemicals found, a mass spectrometer was employed.

4.1 Physical examinations

When examining ammunition, the emphasis lay on ruling out any liquid chemical charges and distinguishing it from explosive ammunition.

The ultrasonic wall thickness tester was used to measure the wall thickness of ammunition. Since chemical warfare ammunition usually has thinner walls than explosive ammunition, such measurements permit conclusions to be drawn in this respect. These measurements were also needed to ascertain the correct exposure time for radiography.

The likewise portable electrostethoscope served to determine the presence of fluids. When ammunition is subjected to kinetic stress, the electrostethoscope permits the typical noise of the moving liquid to be detected. The sound waves generated are

picked up by a piezoelectric element, amplified and heard via a headset, provided that the probe of the stethoscope is in direct contact with the item to be examined. Radiography involving X-rays for the non-destructive examination of the internal technical structure was used to identify specific features of chemical warfare ammunition. The transportable X-ray unit (min. 300 keV energy) employed for this purpose requires a 220 V power supply, which was locally available. The exposed film material was developed in a nearby hospital.

4.2 Analysis of samples

A mobile mass spectrometer (MM1) installed in a vehicle was available for sample analysis. The instrument programmed for the detection of chemical warfare agents through selected ion monitoring (SIM) was, with the approval of the in-country escort, also employed for more intrusive examination of samples through the recording of partial spectra within relevant mass ranges and of spectral series. To confirm the identity of chemicals found, the samples taken were first checked by SIM for the absence of chemical warfare agents listed in schedule 1. Then they were identified on the basis of spectral series after being subjected to coarse separation both through fractional evaporation and through chromatographic effects in the diaphragm inlet system used.

The chemicals analyzed included perchloroethylene, ethanol, fuels and CS, which is used both for exercises and for testing of the tightness of gas masks.

For the examination of complex air and coating samples, it would have been necessary to convert the instrument and replace the inlet system by a gas chromatograph for greater sensitivity and selectivity. This was dispensed with for reasons of time.

5. Conclusions

The selected test and analysis equipment of the present state of the art can be successfully used for a challenge inspection. The considerable time still needed can be appreciably reduced

by increasing the number of instruments and of technical staff, by further routine in carrying out the examinations and by refining the processes and equipment, which should be specifically tailored to the time requirements of challenge inspections.

A challenge inspection, with respect to the use of test and analysis equipment, can generally be carried out all the more easily, the more precisely the suspicion giving rise to the challenge is described.

Even at this stage it is possible to ascertain the identification of relevant chemicals quickly, reliably and on the spot. A sample throughput of ten to twenty an hour can be achieved.

Careful examination of complex trace samples needs far more time. Even the taking and preparation of samples in this respect requires a lengthy period. Confinement to a few, carefully selected samples is therefore necessary.

Additional chemical screening procedures with a detection kit similar to that presented in the Netherlands working paper CD/CW/WP.271 can be used to advantage in this connection in order to select samples suitable for more extensive mass spectrometry.

In the present case, the inspection team did not have sufficient staff to develop an adequate basis of data within 24 hours.

In a future trial inspection a so-called "Gammamat" should be used for the radiographical examination of munitions involving gamma rays. This transportable unit, being independent on an external power supply, is expected to permit versatile operation even in confined spaces and the investigation of several items at the same time, thus improving the efficiency of the investigation to a considerable extent.

The trial inspection showed that it was possible to protect sensitive data and facilities, which exist at this site only in a limited number, even though the observer played a very active and challenging role, maintained a constant dialogue with the inspection team and enjoyed the same access as the team. It is not yet possible to generalize these results, because some military installations have far more sensitive data and facilities than the site inspected.
